

Cellular and Molecular Biology, Block 1 Weekly Formative Questions
Week 5 (September 18-21, 2012)

Dignam – Amino Acids, Pt. 1

1. Arginine and histidine in mammals
 - A. are essential because they cannot be synthesized from simple precursors.
 - B. are nonessential, because they can be always synthesized in adequate quantities.
 - C. are conditionally essential because they are not synthesized in adequate quantities by young animals.
 - D. are both synthesized directly from α -ketoglutarate.
 - E. are both synthesized directly from glycine.
2. Glutamate dehydrogenase
 - A. uses only NAD or NADH as substrates.
 - B. uses only NADP or NADPH as substrates.
 - C. is activated allosterically by ATP and GTP.
 - D. is activated allosterically by ADP and GDP.
 - E. is inhibited allosterically by ADP and GDP.

Dignam – Amino Acids, Pt 2

3. Which of the following amino acids is metabolized directly to oxaloacetate?
 - A. aspartate
 - B. lysine
 - C. alanine
 - D. valine
 - E. leucine
4. Homocystinuria results from a defect in
 - A. methionine synthase.
 - B. the branched chain α -keto acid dehydrogenase.
 - C. a cysteine transporter.
 - D. a cystine transporter.
 - E. cystathionine β -synthase.

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Manning – Gluconeogenesis

5. The cost in high-energy phosphate bonds for the formation of 1 mole of glucose from lactate is
- A. 8 moles of adenosine triphosphate (ATP).
 - B. 6 moles of ATP.
 - C. 4 moles of ATP.
 - D. 2 moles of ATP.
6. Each of the following substances are important substrates for gluconeogenesis during fasting **EXCEPT**
- A. pyruvate.
 - B. glycerol.
 - C. lactate.
 - D. amino acids.
 - E. acetyl CoA.

For questions 7 through 9, match the following statements about glycogen storage and gluconeogenesis with the correct tissue(s) (A through D). Each lettered option may be selected once, more than once, or not at all.

- A. Muscle
 - B. Liver
 - C. Brain
 - D. Adipose tissue
7. Glycogen stored in this tissue can be used directly as a source of blood glucose.
8. It is the primary source of lactate, which is used as a substrate for gluconeogenesis.
9. It is the primary source of glycerol, which is used as a substrate for gluconeogenesis.

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Manning – Glycogen Metabolism

10. In glycogen synthesis, the immediate donor of glucosyl units to glycogen is
- A. uridine diphosphate glucose (UDPG).
 - B. glucose-6-phosphate.
 - C. glucose-1,6-bisphosphate.
 - D. guanosine diphosphate glucose.
 - E. glucose-1-phosphate.
11. An inherited disorder of carbohydrate metabolism is characterized by an abnormally increased concentration of liver glycogen with normal structure and no detectable increase in serum glucose concentration after oral administration of fructose. These two observations suggest that the disease is a result of the absence of which of the following enzymes?
- A. Fructokinase
 - B. Glucokinase
 - C. Glucose-6-phosphatase
 - D. Phosphoglucomutase
 - E. UDPG-glycogen transglucosylase
12. Epinephrine stimulates the formation of
- A. AMP.
 - B. the inactive, dephosphorylated form of glycogen synthase.
 - C. the active, phosphorylated form of phosphorylase.
 - D. phosphodiesterase.
 - E. hexokinase.

Maltese – Lipids 3: Triacylglycerols

13. A patient arrives in the ER in a comatose state and you immediately detect the aroma of acetone in his breath. He wife tells you that he is a diabetic and recently consumed a large meal at a family barbeque. She suspects that he forgot to take his prescribed dose of insulin today. Which of the following metabolic events would occur in this patient?
- A. Decreased uptake of fatty acids into the mitochondria
 - B. Increased release of fatty acids from triglycerides
 - C. Increased synthesis of triglycerides
 - D. Decreased fatty acid oxidation
 - E. Decreased amount of acetyl-CoA diverted to acetoacetate

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14. During ketogenesis in the liver the immediate precursor of acetoacetate is
- A. beta-hydroxy butyrate.
 - B. acetoacetyl-CoA.
 - C. beta-hydroxy butyryl-CoA.
 - D. mevalonic acid.
 - E. beta-hydroxy-3-methylglutaryl-CoA.

Maltese – Lipids 4: Phospholipids, Sphingolipids & Arachidonic Acid

15. Phospholipase A₂ action on phosphoglycerides generates
- A. lysophosphoglyceride lacking acyl-1.
 - B. lysophosphoglyceride lacking acyl-2.
 - C. diacylglycerol.
 - D. phosphatidic acid.
 - E. monoacylglycerol.
16. Which of the following is **NOT** a sphingolipid?
- A. Cerebroside
 - B. Ceramide
 - C. Ganglioside
 - D. Leukotriene
 - E. Sphingomyelin

Maltese – Lipids 5: Cholesterol & Steroids

17. You have prescribed a 'statin' drug for one of your patients to help lower his blood cholesterol level. The patient reads on the internet that such drugs inhibit the enzyme, HMG-CoA reductase. He asks you, "What does HMG-CoA reductase do?" A correct response would be, "HMG-CoA reductase....."
- A. catalyzes the formation of beta-hydroxybutyrate.
 - B. catalyzes the formation of acetoacetate from HMG-CoA.
 - C. is one of the enzymes in the pathway for synthesis of palmitate.
 - D. catalyzes the synthesis of HMG-CoA
 - E. catalyzes the conversion of HMG-CoA to mevalonate.

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18. Which of the following statements is **FALSE**?
- A. Dolichol plays a role in the synthesis of glycoproteins
 - B. Farnesyl groups can be attached covalently to some proteins
 - C. An amino acid that is incorporated into bile acids is glycine
 - D. Prostaglandin E is an isoprene derivative
 - E. Lanosterol is precursor of cholesterol

Goodridge – Lipid Digestion, Absorption, and Assimilation

19. A pharmaceutical company wants to develop a drug that will stimulate excretion of cholesterol by increasing excretion of bile acids. Which of the following properties would be most useful?
- A. Inhibits cholesterol 7 α -hydroxylase
 - B. Activates cholesterol 12 α -hydroxylase
 - C. Activates cholesterol 7 α -hydroxylase
 - D. Activates taurine conjugation to cholyl-CoA
 - E. A and B above
20. Your 40-year old patient is a vegetarian who consumes no foods of animal origin. Which of the following is a source for the cholesterol in her body?
- A. Synthesis from acetyl CoA
 - B. Modification of plant sterols
 - C. Synthesis from long-chain fatty acids
 - D. Modification of dietary Orlistat
 - E. Degradation of steroid hormones

(See next page for answers)

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Instructor	Question	Answer
Dr. Dignam	1	C
	2	D
	3	A
	4	E
Dr. Manning	5	B
	6	E
	7	B
	8	A
	9	D
	10	A
	11	C
Dr. Maltese	12	B
	13	B
	14	E
	15	B
	16	D
	17	E
Dr. Goodridge	18	D
	19	C
	20	A